

We find small and large systems' per-subscriber capital investments are comparable, but that small systems' market environments and operating expenses diverge in terms of:

- lower income level in their communities
- fewer local TV broadcast stations
- fewer satellite channels offered
- lower proportion of addressable subscribers
- less overall channel capacity
- lower operating expenses

Despite these substantive and relevant differences between small and large systems, the FCC's pricing guidelines for the entire cable industry are based entirely on average revenues of small systems in the FCC's sample.

3. Effect of Not Properly Accounting for System Size

By not appropriately taking into account the size of cable systems in its estimation of the competitive price differential, the FCC vastly inflates the impact of the outcomes for the very small systems.

The competitive price differential disappears when we run the FCC's own regression model, using the FCC's database, but weight each observation in the FCC's sample by size of system.

4. Commercial Viability of Franchises in the Competitive Sample

Many franchises in the FCC's competitive sample demonstrate poor financial performance. Most of these franchises are part of small systems which perform poorly despite their lower cost structure vis-a-vis larger systems. This may be due to their relative inability to subsidize operations from a broad base of subscribers. Also they may be competing more as commodity cable providers, where price is the only differentiator, versus larger systems which can also compete on features such as longer customer service hours, more programming choices, and enhanced services.

Using the FCC's own financial guidelines³, plus financial data collected in our survey, we show that some of these franchises are producing returns that are inadequate for private investors. In part because their rates are too low, they lack resources for needed reinvestment and even, in some cases, for servicing of their debt.

³Report and Order and Further Notice of Proposed Rulemaking ("1994 Cost of Service"), MM Docket No. 93-215, March 30, 1994. The FCC provides assumptions to be used by cable operators for interest rate (p.102), debt leverage (p.106), rate of return (p.108), and tax expense (p.83).

Such systems have dubious long-term prospects. Low average revenues reported by such systems nevertheless are allowed to contribute to the FCC's estimation of a competitive price differential.

5. Atypical Market Situations in FCC Sample

Since the date of the FCC survey, franchises in the FCC's competitive sample have experienced mergers and acquisitions eliminating competition in their markets.

Our survey also reveals various forms of external subsidy to several of the franchises with particularly low average regulated revenues. Such subsidies include public financing, concessionary debt repayment arrangements, and bank debt repayments via a major shareholder's personal loans to the system.

Several of the franchises in the sample appear close to extinction, for example serving only 28, 58, or 75 subscribers, and are no longer being adequately maintained.

Despite their small size, uncertain market longevity, and other symptoms of non-viability over an extended period, these franchises influence the FCC's estimation of rate guidelines for the cable industry.

D. Evaluation

Methodological errors and non-representativeness of the FCC's sample undermine the Commission's guidelines to reduce cable rates. We conclude that the FCC's methodology underpinning its "1994 Rate Order" is invalid; that the Commission's estimate of a competitive price differential is likely to be overstated; and that it is unreasonable to apply the FCC's current rate guidelines to the cable industry.

II. Background

A. Arthur D. Little Objective

Arthur D. Little Inc. was asked by the National Cable Television Association (NCTA) to evaluate the methodology used by the FCC for its rulemaking on cable TV rates.

This methodology was used by the FCC to calculate a 17 percent differential between "effectively competitive and noncompetitive cable rates," as reported in the March 1994 Second Order on Reconsideration, Fourth Report and Order and Fifth Notice of Proposed Rulemaking ("1994 Rate Order")⁴. Based on this result, the FCC directs cable operators to reduce their rates to prescribed competitive levels.

A valid methodology is essential to support and explain the FCC rules on cable rates. Otherwise, these rules would be arbitrary, with unforeseen consequences for the cable industry and for the public. The FCC's methodology is valid if it meets the following criteria:

- Correct use of appropriate analytic techniques on data that are representative of the cable industry
- Correct application of results to the population of cable systems
- Due consideration of any relevant special attributes of franchises in the sample

We assess the FCC's methodology vis-a-vis each of these criteria.

B. FCC Methodology to Prescribe Cable Rates

To provide a framework to describe our evaluation of the FCC's methodology, we summarize here the key elements of the FCC's approach. In particular, we have referred to attachments to the 1994 Rate Order including "FCC Cable TV Rate Survey Database, Structure of Database and Explanatory Notes," and "Appendix C -- Technical Appendix."

1. Sources of FCC Data

Most of the FCC's data were obtained from a survey of cable system operators conducted between December 1992 - February 1993, concerning attributes of franchises as of September 1992. Additional data were obtained from the 1990 decennial Census of Population and Housing. The 234 variables in the database describe attributes of each franchise.

⁴Second Order on Reconsideration, Fourth Report and Order and Fifth Notice of Proposed Rulemaking ("1994 Rate Order"), MM Docket No. 92-266, March 30, 1994.

2. FCC Sample

Questionnaires were mailed to operators of franchises in the following categories:

- 1 percent random sample of franchises
- Franchise areas believed by the FCC to be subject to competition from more than one multichannel video provider
- Franchises expected to have less than 30 percent penetration
- Franchises that are part of the industry's 100 largest systems.

The FCC survey generated 687 responses; of these, 420 provided data on a second franchise area; thus, the FCC started with a sample of 1107 franchises. Many observations were deleted by the FCC on various grounds, including (a) franchises determined not to be subject to effective competition, (b) second franchise areas of systems in the random sample, (c) franchises that are part of the 100 largest systems, unless they remain in the sample for other reasons.

Following these deletions, the database used in the current analysis comprises 496 franchise observations. After excluding 76 additional franchises because of missing data, the FCC's final sample used in its analysis comprises **420 franchises**:

- **370 in the non-competitive sample**
 - 237 non-competitive franchises
 - 133 "low penetration" franchises, initially classified as "competitive" by the FCC but counted in the "non-competitive" sample for purposes of the current analysis
- **50 in the competitive sample**
 - 39 with private overbuilds (including 11 "low penetration" franchises)
 - 11 with municipally-operated overbuilds (including 4 low penetration franchises)

Sample construction is an extremely important step affecting validity of research findings. The FCC's sample is the source for the Commission's inferences and for its estimation of competitive cable rate benchmarks. In Appendix 1, which describes our statistical analyses, we comment on potentially serious sampling problems. However, our primary focus for this assignment is on other aspects of the FCC's methodology.

3. Database Variables

Database variables include information for each franchise and for the system of which the franchise is a part. These variables, based on data collected in the FCC's survey questionnaires, include:

- **Household and Subscriber Data**
Households in the area; Households passed; Households subscribing to cable; Addressable subscribers
- **Physical Plant Data**
Number of head-ends serving system; Age of principal head-end; Line miles of distribution plant; Proportion of miles above ground, below ground and fiber

- **Ownership**
Owned by MSO; Number of systems in MSO
- **Subscription Revenues**
By tiers and from various sources
- **Market Status**
Franchises with less than 30 percent penetration; Multi-channel competitors in market area; Municipally-operated competitors; Percentage of households in area offered competitive services
- **Franchise Fees**
Amount; How calculated and incurred
- **Rates**
Equipment; Basic tier; Second tier; Third tier
- **Services Offered**
By type of channels carried on Basic, Second and Third tiers

Additional variables, from the census, include median household income, and other demographic attributes associated with the ZIP codes matched to the franchise areas.

The FCC constructed additional variables from data provided by the cable operators. The two most significant are:

- the FCC's dependent variable, called ARIEPS, for average regulated revenue per subscriber including equipment revenues
- the FCC's key independent variable representing market competitiveness, called OVL, for the estimated proportion of households passed in the system that are also passed by a competitor.

Although the FCC database provides a substantial amount of useful information about each franchise and system, it is incomplete because the FCC did not ask directly for information on capital investment or operating expenses, factors relevant to a franchise's revenue requirements. The FCC database provides partial but insufficient indicators of investment (i.e., channel capacity, addressability, density), and of operating expenses (i.e., number of satellite channels).

In the end, the FCC's ultimate regression equation excludes several of these key investment and operating expense indicators.

4. FCC Analysis

The Commission uses regression analysis to estimate the effect of competitive market structure on cable rates. Market competitiveness is represented by OVL. The dependent variable, ARIEPS, serves as the proxy for cable rates charged for regulated services. The FCC reports that it tried many different equations before settling on one with the following independent variables:

- Competitive overlap (OVL)
- Log of median income
- MSO ownership (dummy variable)
- Log of MSO size
- Reciprocal of number of subscribers in the system
- Reciprocal of average total channels
- Proportion of non-broadcast channels
- Proportion of additional outlets
- Proportion of remotes
- Proportion of Tier 2 subscribers
- Proportion of Tier changes
- Low penetration (dummy variable)
- Municipal franchise (dummy variable)

The coefficient of the competition variable OVL, as a predictor of ARIEPS, is -.174. The FCC concludes that market competitiveness, as experienced by the 50 franchises in the competitive sample, is associated with approximately 17 percent lower average revenues per subscriber.

The FCC stipulates this price differential as a target for reduction of rates by virtually all cable systems in the industry.

5. Implementation of FCC Rules

Each cable operator, equipped with the FCC's model, is required to calculate average allowable regulated revenues per subscriber. Variables in the model, such as size of MSO, reciprocal of the number of subscribers in the system, and median income in the community, contribute to estimation of franchise-specific pricing benchmarks, based on the model's estimated coefficients.

The FCC's statistical assumptions and procedures are key to the validity of its analytical conclusions. Significant issues concerning the FCC's statistical methodology are discussed in Appendix 1.

III. Evaluation of FCC Methodology

The FCC has made serious efforts to develop objective standards to implement objectives of the 1992 Cable Act⁵. They have conducted extensive research and analysis in order to determine and to justify specific cable rate benchmarks that can be applied on an individual basis to cable franchises. They have diligently collected industry data and have applied sophisticated analytical techniques.

However, serious shortcomings in the FCC's approach undermine the validity of their conclusions and the rate guidelines being imposed on the cable industry.

A. Arthur D. Little Analyses

Our conclusions are based on a combination of statistical analyses of the FCC's database, primary research, and financial analyses.

1. Statistical Analysis

We analyze the FCC database using several statistical techniques, as described in detail in Appendix 1. We focus in particular on variables related to economic and technology attributes of the franchises, including several ratios and combinations of FCC variables that we employ to highlight common cable industry measures:

- **Market Area**
 - Median household income (INCOME)⁶
 - Basic tier local TV broadcast stations (S7_1LTV)
 - Other tier (2&3) local TV stations (S7_2LTV+S7_3LTV)
- **Cable System: Density**
 - Households passed per mile (S2_HHPAS+S2_MILES)
 - Subscribers per mile (S2_HHSUB+S2_MILES)
 - Subscribers per homes passed (S2_HHSUB+S2_HHPAS)
- **Cable System: Investment and Cost**
 - Addressable subscribers (S2_ASUBS)
 - Age of principal headend (S2_AGEHE)
 - Miles of plant (S2_MILES)
 - Percentage aerial miles (S2_PABOV)
 - Percentage underground miles (S2_PBELO)
 - Percentage fiber miles (S2_PFIBE)
 - Requirement to bury drops (S2_BURY)
 - MSO owned (S2_PARTM)

⁵It is not within our scope in this assignment to comment the FCC's interpretation of the 1992 Cable Act objectives.

⁶ Bracketed variable names are as identified in the FCC database. Several new variables are constructed from multiple FCC variables, e.g., household density (subscribers per mile) is derived by dividing system subscribers (S2_HHSUB) by miles of plant (S2_MILES).

- Number of MSO systems (S2_MSONU)
- Addressability (S2_ASUBS+S2HHSUB)
- **Franchise Area: Density**
 - Households passed per mile (S5_HHPAS+S5_MILES)
 - Subscribers per mile (S5_HHSUB+S5_MILES)
 - Subscribers per homes passed (S5_HHSUB+S5_HHPAS)
- **Franchise Area: Investment**
 - Addressable subscribers (S5_ADDRS)
 - Age of principal headend (S5_HEADA)
 - Line miles of distribution plant (S5_MILES)
 - Percentage aerial miles (S5_PABOV)
 - Percentage below ground (S5_PBELO)
 - Percentage fiber miles (S5_PFIBE)
 - Requirement to bury all cable drops (S5_BURY)
 - Average number of converter boxes rented (S7_FYACB)
 - Average number of remote control units rented (S7_FYARC)
 - Addressability (S5_ADDRS+S5_HHSUB)
- **Franchise Area: Cost**
 - Franchise fees (S6_FPAID)
 - Other fees to franchise authority (S6_\$0, or S6_0%)
 - Basic tier distant TV broadcast stations (S7_1DTV)
 - Basic tier satellite-delivered cable channels (S7_1SAT)
 - Other tier (2&3) distant TV broadcast stations (S7_2DTV+ S7_3DTV)
 - Other tier (2&3) satellite-delivered cable channels (S7_2SAT+S7_3SAT)
 - Total all channels (S7_TOTAC)

2. Arthur D. Little Survey

We interviewed operators of the 50 franchises in the FCC's "competitive" sample during April - June 1994, to supplement the FCC data with information on franchise technology and economic factors that were only partially obtained or not collected at all by the Commission. Interview topics are summarized in Table III-1.

Table III-1. Arthur D. Little Survey Topics

Franchise Technology	Franchise Economics
<ul style="list-style-type: none">• Addressability• Channel capacity• Local studios• Other franchise requirements• Satellite-delivered cable networks• Channels added since 9/92• Date of original construction	<ul style="list-style-type: none">• Subscribers• Employees• Acquisition and/or original construction cost• Annual investment• Current rates• Financial performance - revenues, expenses, cash flow, depreciation

Primary research materials, including a copy of the Interview Guide, and summaries of the survey results, are attached in Appendix 2.

3. Financial Analyses

Data provided by many of the franchise operators are used to calculate their operating income and cash flow margins. We then construct simple financial models using these data, adhering to financial assumptions provided by the FCC⁷, to evaluate financial performance of the franchises.

B. Assessment of Representativeness of FCC Results

In this section, we address the Commission's failure to account properly for size of cable system, focusing on the following points which suggest that the FCC's methodology does not produce results that are valid for most of the cable industry:

- Small systems produce the competitive price differential estimated by the FCC
- Small systems serve a tiny minority of subscribers in the FCC's database and in the industry
- The FCC did not properly account for system size in calculating the competitive price differential
- Small and large systems differ on economic and technology factors
- Small systems have a lower cost structure

⁷Report and Order and Further Notice of Proposed Rulemaking ("1994 Cost of Service"), MM Docket No. 93-215, March 30, 1994. The FCC provides assumptions to be used by cable operators for interest rate (p.102), debt leverage (p.106), rate of return (p.108), and tax expense (p.83).

1. Small Systems Produce Competitive Price Differential

The competitive price differential calculated by the FCC derives primarily from "competitive" and "non-competitive" franchises in the FCC's sample that are part of *small* cable systems, which we define as systems serving fewer than 5000 subscribers⁸.

NCTA submitted an analysis in 1993 demonstrating a price differential only for small systems. This analysis was replicated by the FCC. In the "Appendix C--Technical Appendix" to the "1994 Rate Order," the FCC states it was able to replicate results of commentators that the:

"...competitive [price] differential was large and statistically significant for small cable systems but statistically insignificant for large cable systems." (p.23)

We also tested this question using the FCC's database which includes the following cable franchises:

	Small Systems	Large Systems	Total
Non-Competitive Franchises	207	163	370
Competitive Franchises			
• Overbuilds	19	20	39
• Municipals	10	1	11
Total	236	184	420

Our analysis demonstrates the same result as found by the NCTA and FCC. As shown in Table III-2, which tabulates ARIEPS (the FCC's dependent variable for average revenues) against size of cable systems, there is a price differential only for franchises that are part of small cable systems.

⁸This size breakpoint is close to the median in the FCC's database; it is one of the levels found in cable industry databases to distinguish cable systems by size; it was used by previous commentators in this proceeding; and it classifies franchises into groups that are found to be different to a significant degree in terms of highly relevant characteristics.

Table III-2. Average Revenues per Subscriber (ARIEPS) in FCC Sample

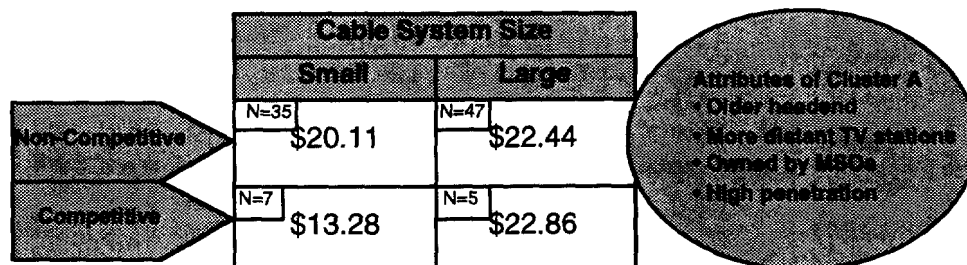
	Cable System Size	
	Small	Large
Non-Competitive (N=370)	N=207 \$21.09	N=163 \$22.58
Competitive (N=50)	N=29 \$15.39	N=21 \$22.12

We also use *cluster analysis* to assemble subgroups of franchises based on economic and technology similarities, and then compare ARIEPS for small and large systems within these otherwise homogeneous groupings. Our use of this technique is described in Appendix 1.

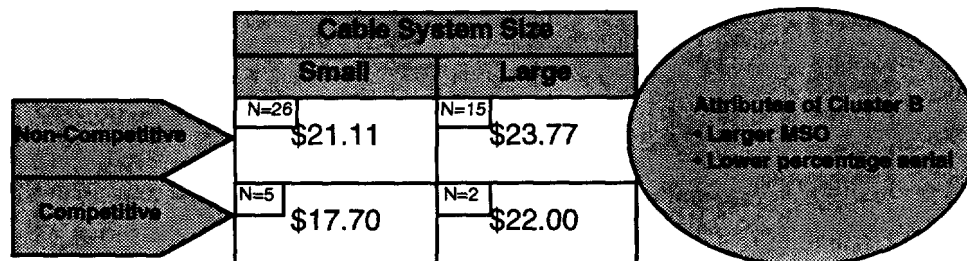
Four groupings emerged. As summarized in Chart III-1, in Clusters A, B, and D, significantly lower ARIEPS is found only for competitive franchises that are part of small cable systems. Cluster C also shows a lower ARIEPS for the small competitive observations, but in addition shows this result, albeit less strongly, for large competitive systems (with, however, only 2 observations in the latter group).

Chart III-1. ARIEPS Differences Within Franchise Clusters

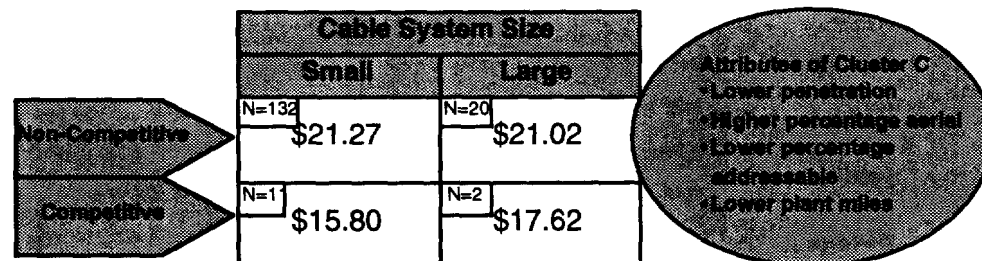
Average Revenues Per Subscriber (ARIEPS) in Cluster A



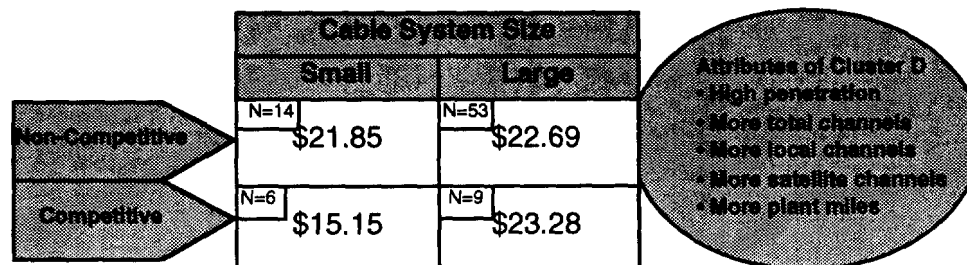
Average Revenues Per Subscriber (ARIEPS) in Cluster B



Average Revenues Per Subscriber (ARIEPS) in Cluster C



Average Revenues Per Subscriber (ARIEPS) in Cluster D



These different techniques confirm that the competitive price differential appears only among franchises that are part of small cable systems⁹.

This presents a serious problem for the FCC's methodology because:

- Small cable systems serve a very small proportion of subscribers in the cable industry
- Small and large cable systems differ on factors relevant to revenue requirements

2. Small Systems Serve Minority of Subscribers

Television & Cable Factbook. (1993 Edition, p. F-3) notes that larger systems serve more than 86 percent of the U.S. cable subscribers. Small systems serve less than 14 percent. The FCC's sample shows this skewed distribution even more strongly.

Although the majority of franchises in the FCC sample are part of smaller systems, these systems serve only 3 percent of the total subscribers in the FCC's database, as summarized below:

Sample	Competitive	Non-Competitive
Total Franchises	50	370
% Small Systems	58%	56%
Total Subscribers	983,300	8,271,000
% Large System Subs (In systems >5000)	95%	97%
% Small System Subs (In systems <5000)	5%	3%

Thus, the FCC's "1994 Rate Order" for an industry serving over 57 million subscribers¹⁰ is based on pricing by franchises that are part of systems reaching approximately 300,000 subscribers, equivalent to 0.5% of the industry total.

⁹In the Technical Appendix to the 1994 Rate Order, the FCC speculates that operators of large competitive systems may collude to maintain higher rates. It is unclear why this should be easier for large systems than for small systems. Another explanation is just as plausible:

- Large systems in "non-competitive" markets face competition from substitutes, including a broader range of local TV broadcast stations; thus their rates, already constrained by market forces even without local multichannel overbuilds, are similar to rates charged by systems in such "competitive" markets
- Small systems in non-competitive markets are less subject to competition from substitutes, although this is now changing with introduction of DBS services, and they have been able to charge higher rates as a result. At the same time, the "competitive" small-system franchises are compelled to reduce rates even below their revenue requirements, because their commodity cable channels can be differentiated only on price, and because some face subsidized or otherwise financially atypical competitors.

¹⁰Estimates of industry size currently range from 57 million subscribers to 59 million (*Cable Television Developments*, NCTA, April 1994, p.1A). For purposes of this comparison, we have selected the lower number.

3. FCC Did Not Properly Account for System Size

The FCC did not properly take into account differing cable system sizes in estimating the competitive price differential.

Our test of weighting each observation in the FCC's sample by cable system size, using the FCC's regression model and the FCC's database, shows that the competitive price differential is reduced to virtually zero; as described in Appendix 1, the coefficient for OVL in this instance is 0.002.

We verify the significance of cable system size as a predictor of ARIEPS using analysis of variance (ANOVA), as described in Appendix 1. We re-classify the FCC sample into three size groups: systems serving fewer than 3000 subscribers, between 3000-15000, and more than 15,000. This analysis shows ARIEPS monotonically increasing with system size. Very small systems serving fewer than 3000 subscribers exhibit significantly lower revenues regardless of competitive status. Thus, comparisons *only* of the main effects, i.e., competitive versus non-competitive, are misleading. Competitive status and size interact in predicting ARIEPS; they are not independent predictors. Therefore, application of rate benchmarks to cable franchises must necessarily and explicitly take into account size as well as competitive status in order to be meaningful.

4. Technology and Economics Distinguish Small and Large Systems

In declining to explore the implications of findings that the competitive price differential appears only among small cable systems, the FCC states:

"...we know nothing about the technology or economics of cable systems to suggest a rationale for the choice of size classes" (Appendix C - Technical Appendix, "1994 Rate Order," p.23).

If small and large systems are alike on attributes relevant to their revenue requirements, the FCC's comment would be appropriate. However, our analysis focusing on cost and investment factors that were neither included, nor considered as candidates, in the FCC regression model, shows that franchises operated by small and large systems are not alike.

We find there are significant economic and technology differences between small and large cable systems. Differences in revenue (e.g., as measured by ARIEPS) can be explained, at least in part, by differences in economic factors.

Simple tabulations of relevant variables illustrate significant differences in economic factors (e.g., median market income, local TV stations) and technology factors (homes passed per mile, total channel capacity, and addressability).

Franchises operated by small cable systems, as highlighted in Table III-3, are associated with:

- Lower market income
- Fewer homes passed per mile
- Fewer local TV broadcast stations
- Less channel capacity¹¹
- Lower proportion of subscribers with addressable converters

Table III-3. Differences in Economic and Technology Factors

	Small Cable Systems	Large Cable Systems
Median Market Income		
• Non-Competitive	\$23,700	\$32,000
• Competitive		
- Overbuilds	\$21,700	\$32,500
- Municipals	\$20,500	\$25,600
Homes Passed per Mile		
• Non-Competitive	45.6	92.6
• Competitive		
- Overbuilds	46.1	92.1
- Municipals	63.6	63.3
Local TV stations		
• Non-Competitive	5.7	8.1
• Competitive		
- Overbuilds	5.8	8.3
- Municipals	5.3	3.0
Total channel capacity		
• Non-Competitive	26.2	44.6
• Competitive		
- Overbuilds	41.3	42.6
- Municipals	36.0	36.0
Addressable Subscribers (%)		
• Non-Competitive	7%	33%
• Competitive		
- Overbuilds	10%	30%
- Municipals	43%	0%

To explore more rigorously the relationships between size and economic factors, we use logistic regression analysis, as described in detail in Appendix 1. First, we examine the statistical significance of such factors considered individually; then, we determine which factors (if any) jointly predict the size of the cable system.

¹¹In the FCC database, channel capacity is lower for small cable systems only in the non-competitive sample. However, our survey of *competitive* franchises also finds significantly fewer active channels provided by small-system franchises, as summarized in Table III-7, below.

Our analysis distinguishes small and large cable systems in terms of:

Economic Factors

- *Income level* in the community, which is associated with ability of subscribers to pay for cable, and with local staff compensation
- *Local TV stations*, which represent a competitive substitute for cable
- *Number of satellite channels*, which affects operating expenses as well as providing means for competitive differentiation apart from price

and ***Technology Factors***

- *Addressability*, which involves higher capital investment as well as enhanced opportunities for revenues from premium services
- *Channel capacity*, which involves higher capital investment and allows for non-price competitive differentiation
- *Household density*, which is associated with plant investment per subscriber

Tables III-4 and III-5 list some of the economic and technology variables that individually, and then jointly, differentiate cable systems by size at a high level of statistical significance.

The following is an illustrative example of the predictive technique, using variables which jointly predict the size of systems in the competitive sample:

Attribute	Huntsville (AL0012)	Troy (AL0127)
Income	\$31,900	\$17,365
Total channels	40	44
MSO Ownership	Yes	Yes
Density (HP/Mi)	87.7	44.8
Calculate Index-->	+5.3	-3.0
Likelihood Franchise is Large----->	0.996	0.05

This technique leads to creation of a classification table that demonstrates our ability to predict the size of a very high proportion of the cable systems which operate franchises in the FCC's competitive and non-competitive samples.

Competitive		Predicted	
	Actual	Large	Small
	Large	17	4
	Small	5	24

Non-Competitive		Predicted	
	Actual	Large	Small
	Large	136	27
	Small	29	174

Thus we are able to demonstrate the following:

- Small systems are different from large ones
- The difference can be expressed in economic and technology terms

While certain variables in this procedure suggest that small systems have lower investment (e.g., small capacity systems) and operating expenses (e.g., market income, which relates to local salary scales), there are other variables which provide contrary indications. For example, higher density and penetration, which are typical of larger systems, tend to be associated with lower per-subscriber investment.

Table III-4. Individual Predictors of System Size

System Size as Predicted by Economic & Technology Factors (FCC Sample)			
System Attributes	Variables	Competitive N=50	Non-Competitive N=370
Market HIGHER median income MORE local TV stations	INCOME S7_1/2/3LTV	System Size: Large Large	System Size: Large Large
Plant HIGHER % addressable subs MORE activated channels MORE homes passed/mile	S2_ASUB/HHSUB S7_TOTAC S2_HHPAS/MILES	System Size: Not Significant Large Large	System Size: Large Large Large
Operating Expenses MORE Satellite Channels	S7_1/2/3STV	System Size: Not Significant	System Size: Large

Table III-5. Joint Predictors of System Size

Best Joint Predictors of Cable System Size		
Sample	Attribute	Variable Name
Competitive N=50	Market Income Level	INCOME
	Total Channels	S7_TOTAC
	Ownership by MSO	S2_PARTM
	Density (HP/Mi)	S2_HHPAS/MILES
Non-Competitive N=370	Market Income Level	INCOME
	Ownership by MSO	S2_PARTM
	Total Channels	S7_TOTAC
	Density (HP/Mi)	S2_HHPAS/MILES
	Penetration (Subs/HP)	S2_HHSUBS/HHPAS
Competitive Without Municipals N=39	Addressability (%Subs)	S5_ADDRS/HHSUBS
	Ownership by MSO	S2_PARTM
	Local TV Stations	S7_1/2/3LTV

5. Small Systems Have Lower Costs

Our primary research provides additional information on investment and operating expenses, to supplement the FCC's database¹². Our results indicate that small systems tend to have lower costs, which in turn allow for lower revenue requirements.

(The small systems also tend to exhibit poorer financial performance, suggesting that even with lower revenue requirements, their rates are inadequate. We discuss this finding in detail in Section IV.)

Based on data from the Arthur D. Little interviews, Table III-6 shows substantial differences between the small and large systems in:

- ratio of franchise subscribers to overall system subscribers, a factor related to ability to subsidize franchise operations from a larger system base
- average monthly rates for basic services (excluding charges for equipment)
- rate increases since the FCC's 9/92 survey.

¹²Contacts were made with operators of all 50 "competitive" franchises. Financial data were obtained for 37 of the franchises. System data, not including financials, were obtained for 6 additional franchises. Operators of 7 of the franchises declined to participate in the survey.

Table III-6. Average Size and Rates Charged

	Small Cable Systems	Large Cable Systems
Average Subscribers		
• Franchise	1117	5044
• System	1990	42543
Ratio Franchise:System	1:1.8	1:8.4
Average Monthly Rates		
• Basic services	\$14.77	\$22.33
• Increase since 9/92	\$ 0.23	\$ 1.94

In Table III-7, we summarize differences in economic and technology factors.

Table III-7. Large Versus Small Systems on Technology and Economics

Technology & Economic Factors	System Size		Difference	
	Small	Large	Number	% of Large
Capital Expenditure				
• Per Mile	\$17,983	\$21,433	\$3,449*	16%
• Per Sub	\$679	\$670	(\$9)	(1%)
• Per Sub (Weighted by age of plant)	\$292	\$344	\$52	15%
Age of Plant (Years since construction)	8	5	(3)	(58%)
Satellite Networks Carried	28	34	6	17%
Addressable Subscribers (% Basic)	10%	41%	31%	75%
Active Channels	40	54	15*	27%
Churn	15%	24%	9%	39%
Subscribers/Employee	524	547	23	4%

* Rounding error

These data show that small systems differ from large systems in terms of:

- **Capital Expenditure**
Lower per mile of plant. Approximately equal per subscriber, due to lower density. Lower per subscriber when *weighted* by the number of years since the investment was made.
- **Age of Plant**
More years since original construction or most recent major rebuild.
- **Satellite Networks**
Fewer, i.e., less service, lower operating cost
- **Addressability**
Lower proportion of subscribers with addressable equipment, i.e., lower capital investment
- **Total Channel Capacity**
Less, i.e., lower capital investment, less ability to exploit expanded or premium service opportunities
- **Churn**
Less, i.e., lower operating cost

These differences reach statistical significance for addressability, channel capacity and age of plant. They approach, but do not quite reach significance at the $P < .10$ level, for satellite networks and churn. However, the apparent differences in capital expenditure as summarized in Table III-7 do not reach statistical significance. This may provide a partial explanation of financial performance results described in Section IV.

Another variable, subscribers per employee (a measure of management efficiency), does not appear to differentiate small and large systems. Large systems have an average of 4 percent more subscribers per employee (547 vs. 524). This may reflect their ability to exploit economies of scale which balances the greater demands on management that are typical of larger systems.

IV. Financial Viability of Competitive Franchises

In our survey, we ask for data on annual revenues, operating expenses, and operating cash flow (revenues minus expenses, before depreciation, debt service and taxes). We also ask for data on capital investment at the time of original construction or of the most recent significant rebuild.

Financial performance is critical because the average revenues of the competitive franchises, and in particular, of the small competitive franchises, are establishing rate benchmarks for the entire industry. If these franchises are commercially non-viable, it is unreasonable to direct the industry to emulate their financial performance through imposition of benchmarks influenced by their rates.

A. Differences Between Small and Large Systems

The survey reveals significant financial differences between the franchises that are part of small and large systems. Our data show small systems in the sample are performing relatively poorly, as summarized in Table IV-1.

Table IV-1. Financial Performance of Small Versus Large Systems

Financial Performance	System Size		Difference	
	Small	Large	Number	% of Large
Average Revenues				
• Total per subscriber per year	\$253	\$376	\$123	33%
• Regulated services	\$200	\$265	\$65	25%
Average Operating Expenses	\$178	\$223	\$44*	20%
Average Cash Flow Margin	27%	40%	13%	32%

* Rounding error

Operating expenses for small-system franchises are, on average, 20 percent lower than expenses of large systems¹³. However, their cash flow margin, which is a key cable TV financial measure, is also on average much lower (by 32 percent)¹⁴. These differences are highly significant statistically.

¹³Small-system franchises' operating expenses per subscriber may be lower as the net result of several factors: lower cost of managing in small markets and of operating less sophisticated plant, less premium programming, but also (pushing towards higher per-subscriber expenses) less ability to exploit economies of scale in staffing.

¹⁴Included in Table IV-1 is one small-system franchise that reports negative cash flow; when this extreme case is excluded, the average cash flow margin of the small-system franchises is 31%.

Several explanations for this finding are plausible:

- Small systems have less channel capacity for premium services and tend to serve markets in which premium services gain lower penetrations relative to basic. Premium services generate higher margins overall than basic services because they produce higher revenues per unit of utilized plant, despite higher expenses on a per-channel basis for premium programming.
- Because they cannot as readily differentiate on service features, smaller systems that are providers of commodity cable channels may be more subject to price competition. Their rates may be governed by competitive pressures without regard, at least in the short term, to their cost of providing service.
- Franchises that are part of small systems lack comparable access to intra-system subsidies, unlike franchises which may represent only a minor portion of the activities of larger systems.

For these and possibly other reasons, many of the small-system franchises in the FCC's competitive sample are not collecting sufficient revenues, even given lower operating expenses, to provide an adequate return on their capital investment.

B. Commercial Viability of Franchises

Average cash flow margins¹⁵ generated by the large systems in the competitive sample, at approximately 40%, are similar to those typically reported in the cable industry. Cash flow margins of large MSOs which serve most industry subscribers are typically 40 percent and higher, as reported in Cablevision (23 May 1994, p. 102) for MSOs among the 50 largest which have provided financial data:

	Cash Flow Margin
Tele-Communications Inc.	44.7%
Time Warner Cable	46.9%
Comcast Cable Communications	45.3%
Continental Cablevision	43.9%
Cablevision Systems	37.8%
Jones Intercable	44.2%
Cablevision Industries	48.8%
Adelphia Communications	56.8%
Viacom International	43.7%
Falcon Cable TV	64.7%

¹⁵Cash flow margin is operating cash flow (revenues minus operating expenses), as a proportion of revenues. Another cable industry term for operating cash flow is "cable cash flow."

	Cash Flow Margin
Century Communications	58.5%
Scripps-Howard Cable	40.2%
KBLCOM	39.2%
TCA Cable TV	51.0%
Multimedia Cablevision	51.9%
TKR Cable	49.5%
Columbia International	47.2%
Summit Cable Services	61.0%

By comparison, the average cash flow margins of the small-system franchises are much lower, at 27 percent.

Our survey data indicate that 10 franchises produce cash flow margins at 25 percent or lower; all of these are small-system franchises. Another 7 produce cash flow margins between 25-30 percent, still well below industry norms. In the latter group, 3 are small-system franchises. Thus, small-system franchises account for 13 of 17 in the competitive sample, for which we have data, that generate below-norm returns.

A full listing of financial measures for all franchises providing these data is provided in Appendix 3. Identities of the franchises are re-coded to protect their proprietary financial information.

1. Financial Model Tests Commercial Viability

To test the commercial viability of the franchises reporting below-norm cash flow margins, we employ a simple financial model which measures the pre-tax equity rate of return produced by these cash flows, given the amount of equity investment in the franchise.

Key financial assumptions for the model are based upon guidelines provided by the FCC in its "1994 Cost of Service" Report and Order:

- Interest rate: 8.5%
- Debt leverage 50%
- Overall rate of return 11.25%
- After-tax return to equity 14% (Derived using FCC formula)
- Allowed additional return for tax¹⁶ 7.21% (Derived using FCC formula)

These assumptions define a pre-tax equity rate of return of 21.21 percent (i.e., 14 percent plus 7.21 percent).

¹⁶We use the 34% federal corporate tax rate as assumed by the FCC. The current corporate tax rate, now 35%, would increase the "allowed additional return for tax" and thus the target pre-tax equity rate of return. We also do not take into account state taxes.

Where the FCC has not provided guidance, we use assumptions that are conservative in the sense that they will not underestimate financial returns and that mirror common practice in the industry:

- Debt repayment
 - Term (Years) 9 No factor for small operators
 - Start date (Year) 3
- Terminal multiple of Cash Flow 9 No factor for overbuild competition
- Real annual cash flow growth 1% Growth despite no added investment
- Mature cash flow level (Year) 1 No start-up period after capital investment
- Annual capital investment \$0 No factor for plant upgrade and converter replacement

Of the franchises that we surveyed, there are 11 that provide all relevant financial information including data on capital investment¹⁷, and that report cash flow margins of 35 percent or less.

Model runs, which are attached in Appendix 3 and summarized in Table IV-2, confirm that these franchises, except for one (QQ147 with 34 percent cash flow margin) provide returns to equity investors that fail to achieve the 21 percent pre-tax equity IRR target.

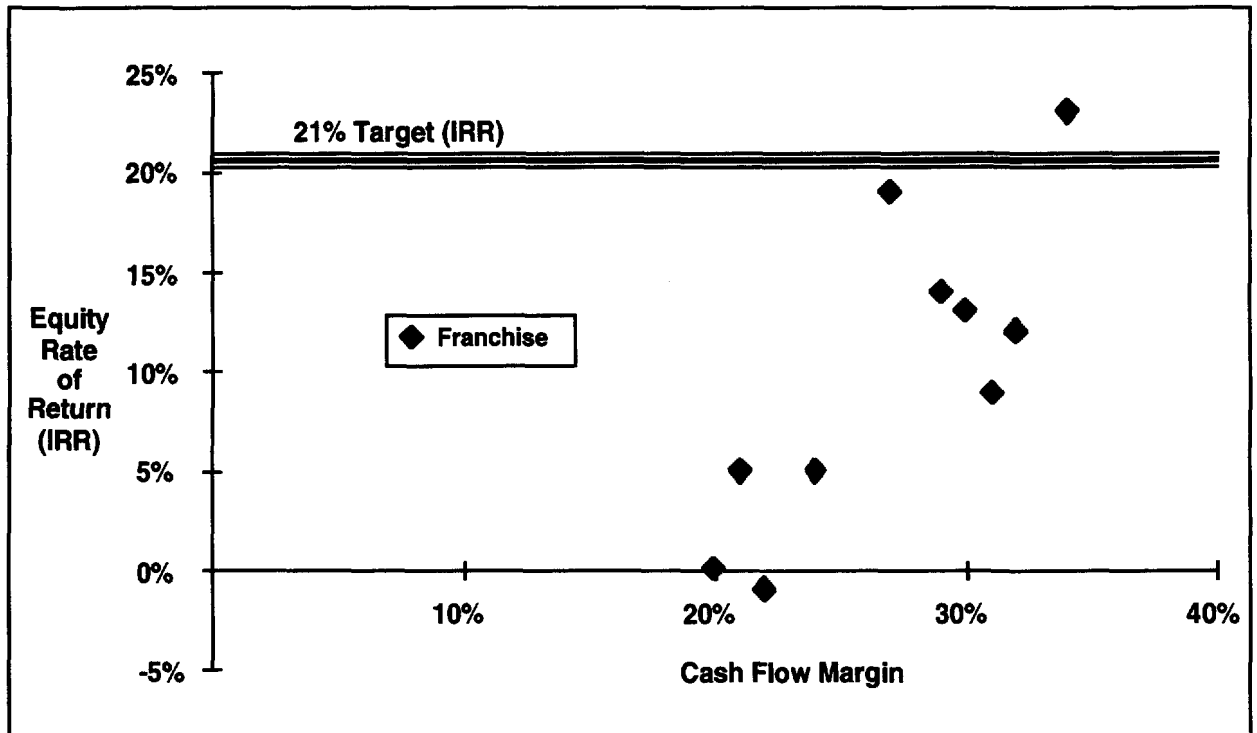
Table IV-2. Internal Rates of Return versus Cash Flow Margins

Franchise	Cash Flow Margin	Equity IRR
QQ111	20%	0%
QQ150	21%	5%
QQ159	22%	-1%
QQ115	24%	5%
QQ140	24%	9%
QQ145	27%	19%
QQ146	27%	19%
QQ134	29%	14%
QQ151	30%	13%
QQ135	32%	12%
QQ147	34%	23%

¹⁷ In some cases, capital investment information was unavailable because of the passage of time or change of ownership. Where available, we use most recent rebuild investment rather than original capital investment; this reflects the most current investment levels for cable plant but is conservative because rebuilds seldom involve complete plant replacement, e.g., of strand, headend equipment, or CPE, and thus tend to understate total investment in the system

Chart IV-1 illustrates the same finding. With their low returns, some of these franchises are unlikely to survive over the long term and the others will face continuous difficulties obtaining funds for reinvestment.

Chart IV-1 Rate of Return for Franchises with Low Cash Flow Margins



Franchises that are commercially non-viable or financially constrained from reinvestment should not be included in a sample that is used to establish benchmarks for the entire cable industry.

Our survey does not provide sufficient financial data to calculate cash flow margins for all franchises in the sample. Financial performance may be inferred, however, from the FCC's ARIEPS variable. As depicted in Chart IV-2, franchise cash flow margin and ARIEPS are related; our correlation analysis indicates a .63 level of correlation. This is not a surprising result. However, it suggests that detection of very low ARIEPS scores should be followed by additional research on the franchise's financial condition, and that it is likely to be inappropriate to allow such franchises to influence calculations of rate benchmarks for the cable industry.